

Novel Application of the EK Glove Port for Single-Incision Diverting Sigmoid Loop Colostomy in Advanced Rectal Cancer

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ABSTRACT

Background and Objectives: In patients with obstructing rectal cancers who require intestinal diversion before neoadjuvant therapy, minimizing diversion-related recovery and instituting early chemoradiation are critical to optimizing outcomes.

Methods: A novel, simple, safe, and inexpensive technique was developed for single-port laparoscopic diverting sigmoid loop colostomy in a low-resource environment.

Results: Ten consecutive patients with locally advanced rectal cancer underwent single-port, diverting sigmoid loop colostomy using a novel application of the EK glove port. Operative time averaged 59.5 min (range 40–75 min). There were no conversions to multiport laparoscopy or open surgery. There were no intraoperative or early postoperative surgical complications. All patients started chemoradiation therapy within 1 week of diverting colostomy. No surgical reinterventions were required.

Conclusion: Single-port laparoscopic diverting sigmoid loop colostomy utilizing an EK glove port is a novel, technically simple, safe, and cost-effective procedure, especially applicable to patients with obstructing rectal cancer who receive care in a low resource environment.

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INTRODUCTION

Some patients with obstructing rectal cancers and other pelvic malignancies require intestinal diversion before initiation of chemoradiation therapy. Operations in which ostomies are created have a high rate of surgical complications compared with other types of common surgical procedures, significant negative effects on quality of life, and ongoing morbidity related to ostomy care.¹ Minimizing postoperative complications and diversion-related recovery are particularly important in patients with advanced rectal cancer who need prompt institution of chemoradiation for optimal outcomes. Intestinal diversion can be accomplished with open surgery, trephine surgery, multiport laparoscopy, single-port laparoscopy, or computer-assisted (robotic) laparoscopy.^{2–6} In their most recent Clinical Practice Guideline (2015), the American Society of Colon and Rectal Surgeons strongly recommends that “when feasible, laparoscopic ostomy formation is preferred to ostomy formation via laparotomy.”¹ For single-incision laparoscopic ostomy formation, there are a number of commercially available and convenient single-access devices. However, in low-resource environments, the cost of these devices inhibits their widespread availability and use. To provide patients the benefits of a single-port laparoscopic colostomy at a minimum of cost, the authors used a novel application of the EK glove port.⁷

MATERIALS AND METHODS

Ten consecutive patients who presented to the surgical oncology clinic at the University Hospital “G. Stranski,” Medical University, Pleven, Bulgaria, between January 2017 and April 2018 were included in this study. The study group comprised the following: (1) patients with obstructing rectal cancers that were located very low (less than 3 cm from the anal verge) and therefore not candidates for sphincter-preserving procedures; (2) patients with any obstructing rectal cancer that was also metastatic; and (3) patients with any obstructing rectal cancer in which the patient was too elderly and/or too frail

to allow a definitive resection. All 10 patients needed intestinal diversion before beginning chemotherapy, radiation therapy, or both.

A 2- to 2.5-cm-diameter round incision was made at a preoperatively marked stoma site in the left lower quadrant. Access to the abdominal cavity was gained via this incision. An EK glove port was created using one 10-mm trocar and two 5-mm trocars (**Figure 1**). The glove port was inserted via the planned stoma site and pneumoperitoneum was obtained (**Figure 2**). Lateral to medial mobilization of the sigmoid colon was performed with monopolar hook cautery and an atraumatic grasper (**Figure 3**). Once mobilized sufficiently, the sigmoid colon was exteriorized through the port site. The EK glove port was removed, and a loop colostomy was matured in the standard fashion (**Figure 4**). There were no surgical incisions requiring closure.

Standard demographic and clinical, intraoperative, and perioperative data were collected. Patients were followed up for at least 6 mo.

RESULTS

The median age of the patients was 72.9 y. Operative time averaged 59.5 min (range 40–75 min). There were no conversions to open surgery or multiport laparoscopy. There were no intraoperative or early postoperative complications. A liquid diet was begun on postoperative day 1 and the diet was advanced as tolerated. The median time to first flatus was 1 day. The average length of hospital stay was 3 days. All patients started neoadjuvant chemo-

therapy, radiation therapy, or both within 1 week of surgery. No surgical reinterventions were required.

All patients were followed up for at least 6 months. One patient died from progressive malignancy. Three patients underwent definitive resection after neoadjuvant therapy. One patient developed a parastomal hernia that did not require surgical intervention.

There was no expense to the patients for the EK single-port system.

DISCUSSION

Laparoscopic colorectal surgery has become standard practice over the past 2 decades.^{8–12} Laparoscopic techniques for stoma formation are well established as safe, effective, and often preferred.^{1,13} In addition to the expected advantages of less pain and faster recovery than with open surgery, laparoscopic approaches to ostomy formation have the advantages of facilitating optimal selection of the colostomy site, mobilization of the colon under laparoscopic vision, avoidance of colonic twisting, minimal disruption to intestinal function, and rapid postoperative recovery.^{1,14} In patients with advanced rectal malignancy who require intestinal diversion prior to institution of chemoradiation therapy, uneventful and rapid healing is particularly important to allow prompt initiation of therapy. Single-port laparoscopic diverting sigmoid colostomy, performed through the colostomy site, eliminates the need for skin incisions other than the colostomy site itself.^{15,16} For single-port colostomy, there are a number of commercially available and convenient single-access devices. However, in low-resource environments, the cost of these devices inhibits their widespread availability and use. The novel application of the EK glove port described here overcomes any cost disincentive.

The EK glove port technique was developed by Dr. Elbert Khiangte at the International Hospital, Guwahati, Assam, India. It was initially developed to facilitate single-incision laparoscopic cholecystectomy in a limited-resource environment. The EK glove port is created by the surgeon table side, in the sterile surgical field, using sterile surgical gloves, a small flexible ring, a larger rigid ring, and standard 5- to 10-mm trocars. The technique is well demonstrated in videos available on YouTube.^{17,18} Because the fascia opening is quite small, a tip to easily place the system is doing so with the glove, the inner flexible ring, and the three cannulas at the same time. Another tip is to always check whether the sigmoid has enough length to be exteriorized without any mobili-

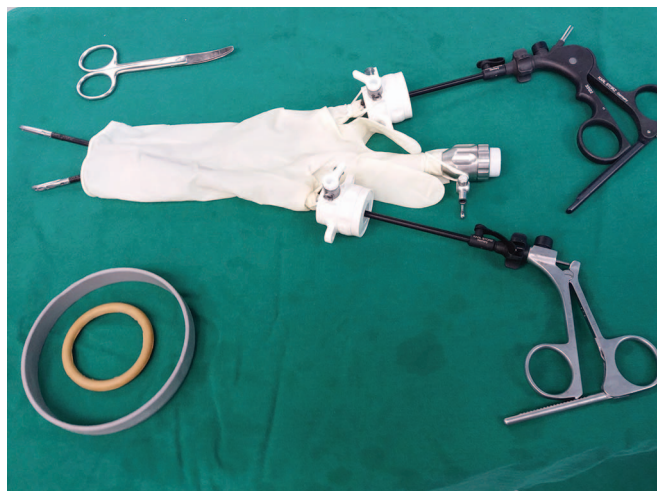


Figure 1. EK glove port.

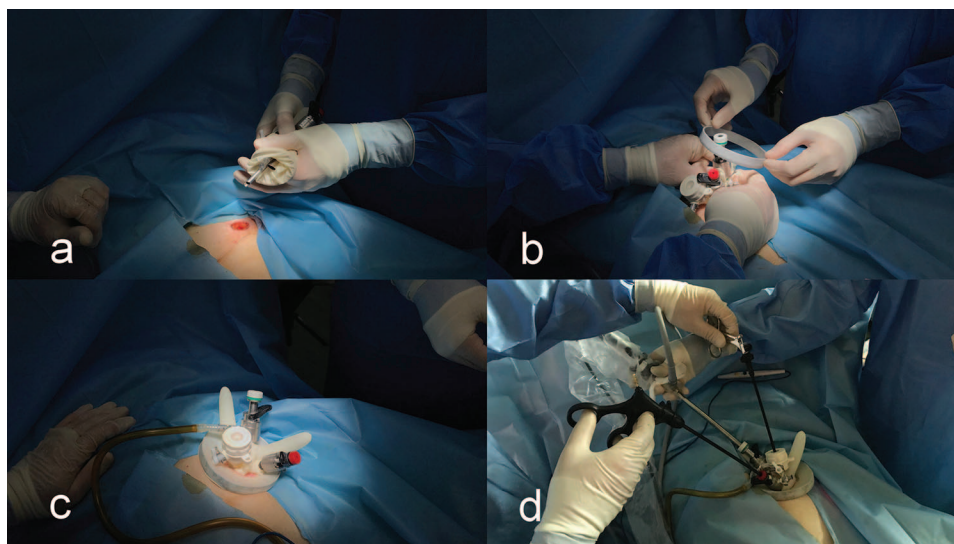


Figure 2. Placement of EK glove port. **A**, Introducing the glove, the inner flexible ring, and the three cannulas at the same time. **B**, Applying the outer rigid ring. **C**, Creating of pneumoperitoneum. **D**, Introducing the laparoscope and the working instruments.



Figure 3. Intraoperative view via the EK glove port.

zation because this could save operative time and reduce the trauma. When lateral mobilization is required, sufficient traction is done with the left instrument. Thus, the plane between retroperitoneum and mesosigmoid is followed securely. Since the introduction of this technique in 2011, several series have been published of its use for cholecystectomy, choledochal cyst management, and appendectomy.^{19–23}

There are two publications of glove port use for colostomy.^{24,25} Rodicio Miravalles et al.²⁴ in Oviedo, Spain, describe six patients with various diagnoses who underwent single-incision glove port diverting sigmoid colostomy. There were no intraoperative or early postoperative complications. The authors concluded that “the glove technique represents the most economic and least invasive approach for the surgical procedure of stomas.” Shah



Figure 4. Appearance of the abdomen after utilization of the EK glove port for diverting colostomy.

et al.²⁵ in Dublin, Ireland, shared their experience with five patients undergoing diverting ileostomy or colostomy, emphasizing principles of the procedure.

The current series represents the largest published experience to date of diverting sigmoid loop colostomy utilizing a glove port. The limitations of this study are those inherent to any retrospective series. The advantages of this study include the larger experience, longer follow-up, and broader exposure of this novel, simple, and cost-effective technique.

CONCLUSION

This novel application of an EK glove port technique to single-incision laparoscopic diverting sigmoid loop colostomy enables surgeons practicing in low-resource environments to offer a technically simple, safe, and cost-effective procedure to their patients with advanced rectal cancer.

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